

WHAT IS CLAIMED IS:

1. A network connection device for connecting a first IEEE 1394 bus and a second IEEE 1394 bus, comprising:
 - 5 a data reception unit configured to receive data transferred from a transmission node connected to the first IEEE 1394 bus through a first isochronous channel on the first IEEE 1394 bus;
 - 10 a data transfer unit configured to transfer the data to a reception node connected to the second IEEE 1394 bus through a second isochronous channel on the second IEEE 1394 bus;
 - 15 a query reception unit configured to receive a query on information regarding the transmission node from the reception node, by using a prescribed packet on the second IEEE 1394 bus;
 - 20 an inquiry unit configured to make an inquiry on the information regarding the transmission node to the transmission node, by using a prescribed packet on the first IEEE 1394 bus, upon receiving the query;
 - 25 a reply reception unit configured to receive a reply to the inquiry from the transmission node, by using a prescribed packet on the first IEEE 1394 bus; and
 - 30 a reply notification unit configured to notify the reply to the reception node, by using a prescribed packet on the second IEEE 1394 bus, upon receiving the reply.
2. The network connection device of claim 1, wherein the prescribed packet used by the query reception unit, the inquiry unit, the reply reception unit, and the reply notification unit is any one of an asynchronous stream, and an asynchronous packet.
3. The network connection device of claim 1, wherein the prescribed packet received by the reply reception unit

contains information for identifying the transmission node and information for identifying a plug or sub-unit of the transmission node that is to be used for transferring the data, as the information regarding the transmission node.

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4. The network connection device of claim 1, wherein the reply notification unit notifies the reply that contains the information regarding the transmission node so as to enable the reception unit on the second IEEE 1394 bus to 10 carry out an authentication and key exchange procedure directly with the transmission node on the first IEEE 1394 bus according to the information regarding the transmission node that is contained in the reply.

15 5. The network connection device of claim 1, wherein the inquiry unit makes the inquiry by pretending that a virtual plug or sub-unit of the network connection device is receiving the data on the first isochronous channel; and the reply notification unit notifies the reply by 20 pretending that a virtual plug or sub-unit of the network connection device is transmitting the data on the second isochronous channel.

6. The network connection device of claim 5, wherein the 25 prescribed packet used by the query reception unit, the inquiry unit, the reply reception unit, and the reply notification unit is any one of an asynchronous stream, and an asynchronous packet.

30 7. The network connection device of claim 5, wherein the prescribed packet used for the query received by the query reception unit contains information for identifying the reception node and information for identifying a plug or sub-unit of the reception node that is to be used for 35 transferring the data, as information regarding the

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reception node;

the prescribed packet used for the reply received by the reply reception unit contains information for identifying the transmission node and information for identifying a plug or sub-unit of the transmission node that is to be used for transferring the data, as the information regarding the transmission node; and

the network connection device further comprises:

a first authentication and key exchange processing unit configured to carry out an authentication and key exchange procedure between the plug or sub-unit of the transmission node which replied to the inquiry on the first IEEE 1394 bus and the virtual plug or sub-unit of the network connection device; and

15 a second authentication and key exchange processing unit configured to carry out an authentication and key exchange procedure between the virtual plug or sub-unit of the network connection device and the plug or sub-unit of the reception node on the second IEEE 1394 bus.

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8. The network connection device of claim 7, further comprising:

an encryption key information reception unit configured to receive information regarding an encryption key related to the virtual plug or sub-unit, from the transmission node on the first IEEE 1394 bus, after the authentication and key exchange procedure by the first authentication and key exchange processing unit is completed; and

30 an encryption key information transfer unit configured to transfer the information regarding the encryption key to the reception node on the second IEEE 1394 bus, after at least a part of the authentication and key exchange procedure by the second authentication and key exchange processing unit is completed.

9. The network connection device of claim 1, further comprising:

5 a memory unit configured to store a correspondence among an information for identifying the first isochronous channel, an information for identifying the transmission node, and an information for identifying the second isochronous channel;

10 wherein the inquiry unit makes the inquiry to the transmission node as determined by referring to the correspondence stored in the memory unit, according to the information for identifying the second isochronous channel that is contained in the query received by the query reception unit.

15 10. A network connection device for connecting a first network and a second network, the first network supporting a use of one or more encryption keys for transmission and/or reception of encrypted data between nodes connected to a same network, and the second network supporting a use of an identical encryption key and a use of transmission and/or reception through a prescribed channel for transmission and/or reception of encrypted data between nodes connected to a same network, the network connection device comprising:

a data reception unit configured to receive data transferred from a node connected on the first network;

30 a data transfer unit configured to transfer the data received by the data reception unit to a node connected on the second network through the prescribed channel on the second network;

an authentication request reception unit configured to receive an authentication request from one node connected on the second network;

35 an encryption key information reception unit

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configured to receive an encryption key information regarding an encryption key for a specific data to be transferred to the specific channel on the second network from another node connected on the first network which is
5 transmitting the specific data to the network connection device; and

an encryption key information transfer unit configured to transfer the encryption key information to said one node.

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11. The network connection device of claim 10, further comprising:

an inquiry unit configured to make an inquiry on information for identifying a specific channel by which
15 said one node is receiving data, to said one node upon receiving the authentication request;

a reply reception unit configured to receive a reply to the inquiry from said one node;

wherein the encryption key information reception unit receives the encryption key information regarding an encryption key for the specific data to be transferred to the specific channel on the second network as specified by information contained in the reply received by the reply reception unit.

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12. The network connection device of claim 10, further comprising:

a first authentication and key exchange processing unit configured to carry out an authentication and key exchange procedure with said another node; and
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a second authentication and key exchange processing unit configured to carry out an authentication and key exchange procedure with said one node.

35 13. A communication device, connected to a first IEEE 1394

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bus, for receiving data through a network connection device connected to the first IEEE 1394 bus from a transmission node on a second IEEE 1394 bus, the communication device comprising:

- 5 a data reception unit configured to receive data transferred from the network connection device, through a first isochronous channel on the first IEEE 1394 bus;
- 10 a query unit configured to make a query on information regarding the transmission node to the network connection device by using a prescribed packet on the first IEEE 1394 bus, when the data received by the data reception unit are encrypted;
- 15 a reply reception unit configured to receive a reply to the query from the network connection device by using a prescribed packet on the first IEEE 1394 bus, the reply being obtained by the network connection device by making an inquiry on the information regarding the transmission node on the second IEEE 1394 bus upon receiving the query; and
- 20 an authentication and key exchange processing unit configured to carry out an authentication and key exchange procedure directly with the transmission node on the second IEEE 1394 bus, according to the reply received by the reply reception unit.

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14. The communication device of claim 13, wherein the reply reception unit receives the reply that contains the information regarding the transmission node, and the authentication and key exchange processing unit carries out the authentication and key exchange procedure according to the information regarding the transmission node that is contained in the reply.
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- 35 15. A network connection method for connecting a first IEEE 1394 bus and a second IEEE 1394 bus, comprising the

steps of:

- (a) transmitting data through a first isochronous channel from a transmission node on the first IEEE 1394 bus;
- 5 (b) receiving the data transmitted from the transmission node through the first isochronous channel on the first IEEE 1394 bus at a network connection device, and transferring the data from the network connection device to a reception device on the second IEEE 1394 bus through a second isochronous channel on the second IEEE 1394 bus;
- 10 (c) receiving the data transferred from the network connection device through the second isochronous channel on the second IEEE 1394 bus at the reception node, and when the data are encrypted, making a query on information regarding the transmission node from the reception node to the network connection device by using a prescribed packet on the second IEEE 1394 bus;
- 15 (d) making an inquiry on the information regarding the transmission node from the network connection device to the transmission node by using a prescribed packet on the first IEEE 1394 bus, upon receiving the query from the reception node;
- 20 (e) transmitting a reply to the inquiry from the transmission node to the network connection device by using a prescribed packet on the first IEEE 1394 bus, upon receiving the inquiry from the network connection device; and
- 25 (f) notifying the reply from the network connection device to the reception device by using a prescribed packet on the second IEEE 1394 bus, upon receiving the reply from the transmission node.

16. The network connection method of claim 15, further comprising the step of:

- 35 (g) carrying out an authentication and key exchange procedure directly with the transmission node, at the

reception node according to information contained in the reply.

17. The network connection method of claim 15, wherein:

5 at the step (c), the reception node makes the query that contains information for identifying the reception node and information for identifying a plug or sub-unit of the reception node that is to be used for transferring the data;

10 at the step (d), the network connection device makes the inquiry by pretending that a virtual plug or sub-unit of the network connection device is receiving the data on the first isochronous channel;

15 at the step (e), the transmission node transmits the reply that contains information for identifying the transmission node and information for identifying a plug or sub-unit of the transmission node that is to be used for transferring the data; and

20 at the step (f), the network connection device notifies the reply by pretending that a virtual plug or sub-unit of the network connection device is transmitting the data on the second isochronous channel.

18. The network connection method of claim 17, further comprising the steps of:

25 (g) carrying out an authentication and key exchange procedure between the plug or sub-unit of the transmission node and the virtual plug or sub-unit of the network connection device; and

30 (h) carrying out an authentication and key exchange procedure between the virtual plug or sub-unit of the network connection device and the plug or sub-unit of the reception device.